

Lab 19 - Configuring CUBE with a Single Gatekeeper VIA Zone

CCNA Voice Lab 19

Configuring CUBE with a Single Gatekeeper VIA Zone

Lab Objective:

The objective of this lab exercise is for you to learn and understand how to implement an integrated gatekeeper with the CUBE

Topic Description:

IP-to-IP gateways have the ability to route between, or connect, two different VoIP calls. This means that (unlike TDM-to-IP gateways), a call has two VoIP call legs. Gatekeepers are optional components in an H.323 network. If implemented, gatekeepers may be considered the most important component of the H.323 network and it is mandatory that all endpoints use their services. Endpoints communicate with the gatekeeper via the RAS protocol

Lab Difficulty:

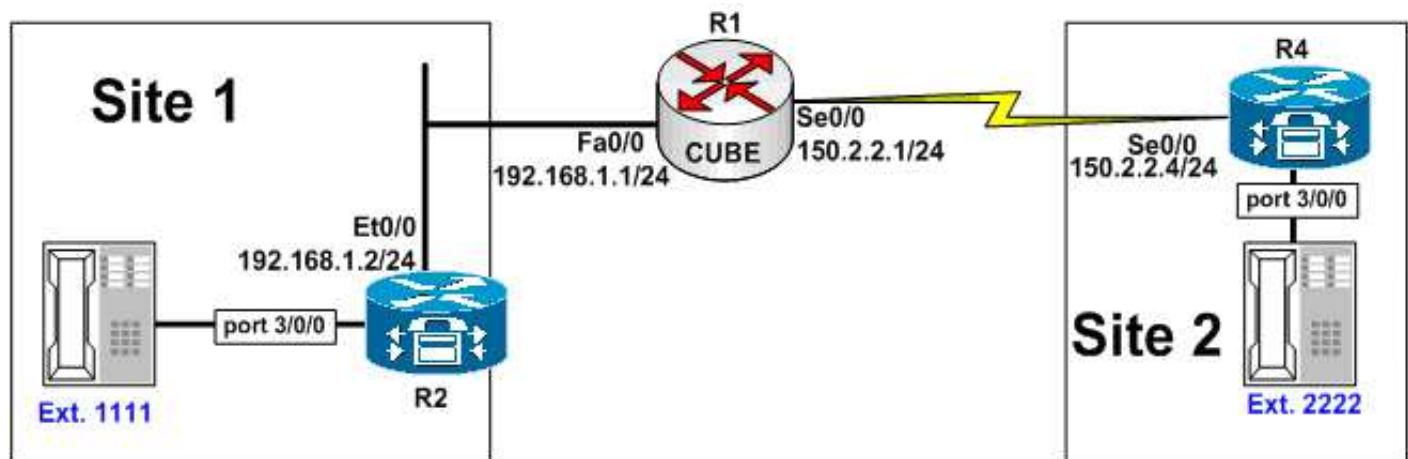
This lab has a difficulty rating of 5/10

Readiness Assessment:

When ready for your exam, you should be able to complete this lab in no more than 15 minutes

Lab Topology:

Please use the following topology to complete this lab exercise:



Lab 19 Configuration Tasks

Task 1:

Configure the hostnames and IP addresses on R1, R2 and R4 as illustrated in the diagram. Configure R4 to provide clocking to R2. Configure the clock rate on R4 as 800Kbps

Task 2:

Configure WAN connectivity between R1 and R4 using the IP addresses specified in the diagram. Configure R4 to provide a clock rate of 800Kbps to R1

Task 3:

Configure IP connectivity between R1 and R2 using the addresses illustrated in the diagram

Task 4:

Configure IP connectivity between R1, R2, and R4 using a routing protocol of your choice

Task 5:

Configure CUBE to allow H.323-to-H.323 calls between R2 and R4

Task 6:

Configure H.323 gatekeeper functionality on the CUBE. VIA zone configuration should be used. Configure the local zone as CUBE-ZONE. Configure two additional local zones for R2 and R4. The zone for R2 should be named R2-ZONE and the zone for R4 should be named R4-ZONE. Configure the zone prefixes for these zones

Task 7:

Configure the appropriate dial peers on R1, R2, and R4 based on the extensions illustrated in the diagram. The VoIP dial peers should be configured to use a gatekeeper

Task 8:

Configure a Loopback interface on R1. This Loopback interface should be used to register to the local gatekeeper. Use any interface number and IP address you want

Task 9:

Configure R2 and R4 to register with the respective gatekeepers using Unicast. R2 should register in the R2-ZONE and R4 should register in the R4-ZONE. You may configure an H.323 ID of your choice for R2 and R4

Task 10:

Verify your configuration using the appropriate Cisco IOS **show** and **debug** commands

Lab 19 Configuration and Verification

Task 1:

```
Router(config)#hostname R1
R1(config)#exit
```

```
Router(config)#hostname R2
R2(config)#interface Serial0/0
R2(config-if)#description .Connected To R4 Serial 0/1.
R2(config-if)#ip address 150.1.1.2 255.255.255.0
```

```
Router(config)#hostname R4
R4(config)#interface Serial0/1
R4(config-if)#description .Connected To R2 Serial 0/0
R4(config-if)#ip address 150.1.1.4 255.255.255.0
R4(config-if)#clock rate 800000
```

Verify connectivity by performing a simple ping between the two routers

```
R2#ping 150.1.1.4
```

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 150.1.1.4, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 4/4/4 ms

```
R4#ping 150.1.1.2
```

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 150.1.1.2, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 4/4/8 ms

Task 2:

```
R1(config)#int s0/0
R1(config-if)#description .Connected To R4 Serial 0/0.
R1(config-if)#ip address 150.2.2.1 255.255.255.0
R1(config-if)#no shutdown
R1(config-if)#exit
```

```
R4(config)#int s0/0
R4(config-if)#description .Connected To R1 Serial 0/0.
R4(config-if)#ip address 150.2.2.4 255.255.255.0
R4(config-if)#clock rate 800000
R4(config-if)#no shutdown
R4(config-if)#exit
```

Verify connectivity by performing a simple ping between the two routers

R1#ping 150.2.2.4

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 150.2.2.4, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 4/4/4 ms

R4#ping 150.2.2.1

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 150.2.2.1, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 4/4/8 ms

Task 3:

```
R2(config)#int e0/0
R2(config-if)#description .Connected To R1.
R2(config-if)#ip address 192.168.1.2 255.255.255.0
R2(config-if)#no shutdown
```

```
R1(config)#int f0/0
R1(config-if)#description .Connected To R2.
R1(config-if)#ip address 192.168.1.1 255.255.255.0
R1(config-if)#no shutdown
R1(config-if)#exit
```

NOTE: If you are using the Howtonetwork.net rack to complete this lab exercise, then you will also need to configure Sw1 as follows:

```
hostname Sw1
!
vlan 12
 name R1_R2_VLAN
!
interface FastEthernet0/2
 description 'Connected To R1 FastEthernet 0/0'
 switchport mode access
 switchport access vlan 12
 no shutdown
!
interface FastEthernet0/3
 description 'Connected To R2 FastEthernet 0/0'
 switchport mode access
 switchport access vlan 12
 no shutdown
```

Task 4:

```
R1(config)#router eigrp 100  
R1(config-router)#no auto-summary  
R1(config-router)#network 0.0.0.0  
R1(config-router)#exit
```

```
R2(config)#router eigrp 100  
R2(config-router)#network 0.0.0.0  
R2(config-router)#no auto-summary  
R2(config-router)#exit
```

```
R4(config)#router eigrp 100  
R4(config-router)#network 0.0.0.0  
R4(config-router)#no auto-summary  
R4(config-router)#exit
```

Task 5:

```
R1(config)#voice service voip  
R1(conf-voi-serv)#allow-connections h323 to h323  
R1(conf-voi-serv)#exit
```

Task 6:

```
R1(config)#gatekeeper  
R1(config-gk)#zone local CUBE-ZONE howtonetwork.net 192.168.1.1  
R1(config-gk)#zone local R2-ZONE howtonetwork.net invia CUBE-ZONE outvia CUBE-ZONE  
R1(config-gk)#zone local R4-ZONE howtonetwork.net invia CUBE-ZONE outvia CUBE-ZONE  
R1(config-gk)#zone prefix R2-ZONE 1...  
R1(config-gk)#zone prefix R4-ZONE 2...  
R1(config-gk)#no shutdown  
R1(config-gk)#exit
```

Task 7:

```
R1(config)#dial-peer voice 1 voip  
R1(config-dial-peer)#destination-pattern 1111  
R1(config-dial-peer)#session target ras  
R1(config-dial-peer)#exit  
R1(config)#dial-peer voice 2 voip  
R1(config-dial-peer)#destination-pattern 2222  
R1(config-dial-peer)#session target ras  
R1(config-dial-peer)#exit
```

```
R2(config)#dial-peer voice 1 pots  
R2(config-dial-peer)#destination-pattern 1111  
R2(config-dial-peer)#port 3/0/0  
R2(config-dial-peer)#exit  
R2(config)#dial-peer voice 2 voip  
R2(config-dial-peer)#destination-pattern .T  
R2(config-dial-peer)#session target ras  
R2(config-dial-peer)#exit
```

```
R4(config)#dial-peer voice 1 pots  
R4(config-dial-peer)#destination-pattern 2222  
R4(config-dial-peer)#port 3/0/0  
R4(config-dial-peer)#exit  
R4(config)#dial-peer voice 2 voip  
R4(config-dial-peer)#destination-pattern .T  
R4(config-dial-peer)#session target ras  
R4(config-dial-peer)#exit
```

Task 8:

```
R1(config)#int loopback 0
```

```

R1(config-if)#ip add 1.1.1.1 255.255.255.255
R1(config-if)#h323-gateway voip interface
R1(config-if)#h323-gateway voip id CUBE-ZONE ipaddr 192.168.1.1
R1(config-if)#h323-gateway voip h323-id CUBE
R1(config-if)#exit
R1(config)#gateway
R1(config-gateway)#exit

```

Task 9:

```

R2(config)#int e0/0
R2(config-if)#h323-gateway voip interface
R2(config-if)#h323-gateway voip id R2-ZONE ipaddr 192.168.1.1
R2(config-if)#h323-gateway voip h323-id R2-GW
R2(config-if)#exit
R2(config)#gateway
R2(config-gateway)#exit

```

```

R4(config)#int s0/0
R4(config-if)#h323-gateway voip interface
R4(config-if)#h323-gateway voip id R4-ZONE ipaddr 192.168.1.1
R4(config-if)#h323-gateway voip h323-id R4-GW
R4(config-if)#exit
R4(config)#gateway
R4(config-gateway)#exit

```

Task 10:

The first task is to ensure that all endpoints are registered to the gatekeeper:

R1#**show gatekeeper endpoints**

```

GATEKEEPER ENDPOINT REGISTRATION
=====
CallSignalAddr  Port  RASSignalAddr  Port  Zone Name      Type  Flags
-----
1.1.1.1         1720  1.1.1.1        63700 CUBE-ZONE      H323-GW
H323-ID: CUBE
Voice Capacity Max.= Avail.= Current.= 0
150.2.2.4       1720  150.2.2.4      50487 R4-ZONE        VOIP-GW
H323-ID: R4-GW
E164-ID: 2222
Voice Capacity Max.= Avail.= Current.= 0
192.168.1.2     1720  192.168.1.2    53655 R2-ZONE        VOIP-GW
H323-ID: R2-GW
E164-ID: 1111
Voice Capacity Max.= Avail.= Current.= 0

```

Total number of active registrations = 3

R1#

R1#

R1#**show gatekeeper zone status**

```

GATEKEEPER ZONES
=====
GK name      Domain Name  RAS Address  PORT  FLAGS
-----
CUBE-ZONE    howtonetwork. 192.168.1.1  1719  LSV

```

-[Truncated Output]-

```

R2-ZONE      howtonetwork. 192.168.1.1  1719  LS
VIAZONE INFORMATION :
  invia:CUBE-ZONE, outvia:CUBE-ZONE
  intrazone:disabled

```

-[Truncated Output]-

R4-ZONE howtonetwork. 192.168.1.1 1719 LS

VIAZONE INFORMATION :

invia:CUBE-ZONE, outvia:CUBE-ZONE

intrazone:disabled

-[Truncated Output]-

Next, place a call between the extensions in the diagram and verify your configuration:

R1#show gatekeeper calls

Total number of active calls = 2.

GATEKEEPER CALL INFO

=====

```
LocalCallID          Age(secs) BW
1-33002              11      16(Kbps)
Endpt(s): Alias      E.164Addr
src EP: R2-GW      1111
  CallSignalAddr Port RASSignalAddr Port
    192.168.1.2  1720 192.168.1.2  53655
Endpt(s): Alias      E.164Addr
dst EP: CUBE      2222
  CallSignalAddr Port RASSignalAddr Port
    1.1.1.1      1720 1.1.1.1      63700
LocalCallID          Age(secs) BW
2-33002              11      16(Kbps)
Endpt(s): Alias      E.164Addr
src EP: CUBE      1111
  CallSignalAddr Port RASSignalAddr Port
    1.1.1.1      1720 1.1.1.1      63700
Endpt(s): Alias      E.164Addr
dst EP: R4-GW      2222
  CallSignalAddr Port RASSignalAddr Port
    150.2.2.4    1720 150.2.2.4    50487
```

R1#

R1#

R1#show call active voice compact

<callID> A/O FAX T<sec> Codec type Peer Address IP R<ip>:<udp>

Total call-legs: 2

```
5 ANS T260 g729r8 VOIP P1111 192.168.1.2:17978
6 ORG T260 g729r8 VOIP P2222 150.2.2.4:17258
```

R1#

R1#

R1#show voip rtp connections detail

VoIP RTP active connections :

```
No. CallId dstCallId LocalRTP RmtRTP LocalIP RemoteIP
1 5 6 17702 17978 192.168.1.1 192.168.1.2
```

callId 5 (dir=1): called=2222 calling=1111 redirect=
dest callId 6: called=2222 calling=1111 redirect=

```
1 context 83AF6530 xmitFunc 81F62C5C
2 6 5 16812 17258 150.2.2.1 150.2.2.4
```

callId 6 (dir=2): called=2222 calling=1111 redirect=
dest callId 5: called=2222 calling=1111 redirect=

```
1 context 83AF6F70 xmitFunc 81F62C5C
```

Found 2 active RTP connections

The same can be verified on the gateways:

R2#show call active voice compact

<callID> A/O FAX T<sec> Codec type Peer Address IP R<ip>:<udp>

Total call-legs: 2

```
7 ANS T325 g729r8 TELE P1111
8 ORG T325 g729r8 VOIP P2222 192.168.1.1:17702
```

R2#

R2#show voip rtp connections detail

VoIP RTP active connections :

```
No. CallId  dstCallId LocalRTP RmtRTP LocalIP      RemoteIP
1  8        7        17978  17702 192.168.1.2  192.168.1.1
callId 8 (dir=2): called=2222 calling=1111 redirect=
dest callId 7: called= calling=1111 redirect=
1 context 64ED6484 xmitFunc 620406E4
Found 1 active RTP connections
```

R4#show call active voice compact

```
<callID> A/O FAX T<sec> Codec    type Peer Address    IP R<ip>:<udp>
Total call-legs: 2
    9 ANS    T375  g729r8    VOIP P1111    150.2.2.1:16812
    10 ORG   T375  g729r8    TELE P2222
```

R4#

R4#show voip rtp connections detail

VoIP RTP active connections :

```
No. CallId  dstCallId LocalRTP RmtRTP LocalIP      RemoteIP
1  9        10        17258  16812 150.2.2.4    150.2.2.1
callId 9 (dir=1): called=2222 calling=1111 redirect=
dest callId 10: called=2222 calling=1111 redirect=
1 context 64F22ACC xmitFunc 620406E4
Found 1 active RTP connections
```

To view gatekeeper messages and VIA zone processing, use the **debug gatekeeper main 5** command while initiating a call between the H.323 endpoints:

R1#debug gatekeeper main 5

R1#

R1#

R1#

```
*Mar 1 05:22:35.968: gk_rassrv_arq: arqp=0x84427284, crv=0x4, answerCall=0
*Mar 1 05:22:35.968: gk_dns_query: No Name servers
*Mar 1 05:22:35.968: rassrv_get_addrinfo: (2222) Tech-prefix match failed.
*Mar 1 05:22:35.968: rassrv_get_addrinfo: (2222) Matched zone prefix 2 and remainder 222
*Mar 1 05:22:35.968: rassrv_arq_select_viazone: about to check the source side,
src_zonep=0x844278A4
*Mar 1 05:22:35.968: rassrv_arq_select_viazone: matched zone is R2-ZONE, and
z_invianamelen=9
*Mar 1 05:22:35.968: rassrv_arq_select_viazone and z_invianamep=CUBE-ZONE
*Mar 1 05:22:35.968: rassrv_arq_select_viazone(R2-ZONE): Terminating inbound call at the
IPIPGW in zone CUBE-ZONE
*Mar 1 05:22:35.968: gk_gw_select_ipipgw: zonep: 0x8412E8CC, tpp: 0x0, current_endpt: 1
*Mar 1 05:22:35.968: gk_gw_select_ipipgw: Selecting any IPIPGW. qe Kemp.head=0x840960D4,
use_count=1, current_endpt=1
*Mar 1 05:22:35.968: gk_gw_select_ipipgw: Gateway selection will start at the top of the linked list.
use_count=1, current_endpt=0
*Mar 1 05:22:35.972: gk_gw_select_ipipgw: qe Kemp=0x840960D4, loop_count=0
*Mar 1 05:22:35.972: gk_gw_select_ipipgw: Examining tgwp 0x8361CAB0, g_supp_protos: 0x50
qe Kemp: 0x840960D4, loop_count: 1
*Mar 1 05:22:35.972: gk_gw_select_ipipgw: Found an IPIPGW. tgwp: 0x8361CAB0, endptsigIP: 1.1.1.1,
endptrasIP: 1.1.1.1, zone: CUBE-ZONE
*Mar 1 05:22:35.972: gk_gw_select_ipipgw: Selected an IPIPGW.
*Mar 1 05:22:35.972: rassrv_get_addrinfo: (2222) successfully resolved IPIPGW and returning with
return code 0
*Mar 1 05:22:35.996: gk_rassrv_arq: arqp=0x848814F8, crv=0x4, answerCall=1
*Mar 1 05:22:36.016: gk_rassrv_arq: arqp=0x8447FD5C, crv=0x5, answerCall=0
*Mar 1 05:22:36.016: gk_dns_query: No Name servers
*Mar 1 05:22:36.016: rassrv_get_addrinfo: (2222) Tech-prefix match failed.
*Mar 1 05:22:36.016: rassrv_get_addrinfo: (2222) Matched zone prefix 2 and remainder 222
*Mar 1 05:22:36.016: rassrv_arq_select_viazone: about to check the destination side,
dst_zonep=0x84427B04
*Mar 1 05:22:36.020: rassrv_arq_select_viazone: matched zone is R4-ZONE, and
z_outvianamelen=9
*Mar 1 05:22:36.020: rassrv_arq_select_viazone and z_outvianamep=CUBE-ZONE
*Mar 1 05:22:36.020: rassrv_arq_select_viazone: Received ARQ for a zone (R4-ZONE) that has
an outvianame (CUBE-ZONE) specified, but I am that viazone. Continue normal ARQ processing
```

an outviazone (CUBE-ZONE) specified, but I am that viazone. Continue normal ARQ processing
 *Mar 1 05:22:36.020: gk_zone_get_proxy_usage: local zone= R4-ZONE, remote zone= CUBE-ZONE, call direction= 0, eptype= 67586 be_entry= 0
 *Mar 1 05:22:36.020: gk_zone_get_proxy_usage: returns proxied = 0
 *Mar 1 05:22:36.020: gk_gw_select_px: Source and destination endpoints in different local zones
 *Mar 1 05:22:36.020: gk_zone_get_proxy_usage: local zone= CUBE-ZONE, remote zone= R4-ZONE, call direction= 1, eptype= 67650 be_entry= 0
 *Mar 1 05:22:36.020: gk_zone_get_proxy_usage: returns proxied = 0
 *Mar 1 05:22:36.020: rassrv_get_addrinfo: (2222) successfully resolved the alias locally and returning with 0x0
 *Mar 1 05:22:36.049: gk_rassrv_arq: arqp=0x84128738, crv=0x3, answerCall=1

Final Relevant Configuration R1:

R1#**show running-config**

Building configuration...

Current configuration : 1889 bytes

!

version 12.4

service timestamps debug datetime msec

service timestamps log datetime msec

no service password-encryption

!

hostname R1

!

!

!

!

voice service voip

allow-connections h323 to h323

!

!

!

!

!

!

!

!

!

!

!

!

!

!

!

!

interface Loopback0

ip address 1.1.1.1 255.255.255.255

h323-gateway voip interface

h323-gateway voip id CUBE-ZONE ipaddr 192.168.1.1 1719

h323-gateway voip h323-id CUBE

!

interface FastEthernet0/0

description .Connected To Switch 1 FastEthernet 0/2.

ip address 192.168.1.1 255.255.255.0

!

interface Serial0/0

description .Connected To R4 Serial 0/0.

ip address 150.2.2.1 255.255.255.0

!

router eigrp 100

network 0.0.0.0

no auto-summary

!

!

!


```

!
!
dial-peer voice 2000 voip
 destination-pattern 2...
 session target ipv4:150.2.2.4
!
dial-peer voice 1 voip
 destination-pattern 1111
 session target ras
!
dial-peer voice 2 voip
 destination-pattern 2222
 session target ras
!
gateway
 timer receive-rtp 1200
!
!
gatekeeper
 zone local CUBE-ZONE howtonetwork.net 192.168.1.1
 zone local R2-ZONE howtonetwork.net invia CUBE-ZONE outvia CUBE-ZONE
 zone local R4-ZONE howtonetwork.net invia CUBE-ZONE outvia CUBE-ZONE
 zone prefix R2-ZONE 1...
 zone prefix R4-ZONE 2...
 no shutdown

```

Final Relevant Configuration R2:

R2#**show running-config**

Building configuration...

Current configuration : 1557 bytes

```

!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname R2
!
!
!
!
interface Ethernet0/0
 description .Connected To Switch 1 FastEthernet 0/3.
 ip address 192.168.1.2 255.255.255.0
 h323-gateway voip interface
 h323-gateway voip id R2-ZONE ipaddr 192.168.1.1 1719
 h323-gateway voip h323-id R2-GW
!
router eigrp 100
 network 0.0.0.0
 no auto-summary
!
!
!
!
voice-port 3/0/0
!
voice-port 3/0/1
!
voice-port 3/1/0
!
voice-port 3/1/1
!
!
.

```

```

!
!
dial-peer voice 1 pots
 destination-pattern 1111
 port 3/0/0
!
dial-peer voice 2 voip
 destination-pattern .T
 session target ras
!
gateway
 timer receive-rtp 1200

```

Final Relevant Configuration R4:

R4#**show running-config**

Building configuration...

Current configuration : 1552 bytes

```

!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname R4
!
!
!
!
interface Serial0/0
 description .Connected To R1 Serial 0/0.
 ip address 150.2.2.4 255.255.255.0
 clock rate 800000
 h323-gateway voip interface
 h323-gateway voip id R4-ZONE ipaddr 192.168.1.1 1719
 h323-gateway voip h323-id R4-GW
!
!
router eigrp 100
 network 0.0.0.0
 no auto-summary
!
!
!
!
voice-port 3/0/0
!
voice-port 3/0/1
!
voice-port 3/1/0
!
voice-port 3/1/1
!
!
!
!
dial-peer voice 1 pots
 destination-pattern 2222
 port 3/0/0
!
dial-peer voice 2 voip
 destination-pattern .T
 session target ras
!
gateway

```

timer receive-rtp 1200



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